

From: Shyam Sunder <sunder@nist.gov>  
To: "'pregrp@aol.com'" <pregrp@aol.com>  
Subject: Re: Section 13.2, NIST Report WTC 7

Dave,

These were large floors and the combustibles did not ignite simultaneously. The fires spread from combustible to combustible, and from office module to office module. The floor area around column 79 was about 2000 sq. ft. Also, the combustible load on this floor was 6.4 psf about 60 percent greater than the WTC towers and the lower floors of WTC 7. Finally, floors 11 to 13 were not typical open floor plans as in the Lower floors and the towers. They had individual offices around the perimeter providing a barrier to the rapid spread of fires.

Shyam

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**From:** pregrp  
**To:** Shyam Sunder  
**Sent:** Wed Aug 27 08:40:45 2008  
**Subject:** RE: Section 13.2, NIST Report WTC 7

Shyam,

In this note you indicate "ordinary combustibles and combustible load levels." However, in your report it shows high fire temperatures in the area of Column 79 that lasted for two hours. What source of combustion allowed the fire to last that long?

Dave

On Aug 26, 2008, at 5:55:46 PM, "Shyam Sunder" <sunder@nist.gov> wrote:

**From:** "Shyam Sunder" <sunder@nist.gov>  
**Subject:** RE: Section 13.2, NIST Report WTC 7  
**Date:** August 26, 2008 5:55:46 PM EDT  
**To:** "FPESCHULTE@aol.com" <FPESCHULTE@aol.com>, "Nadine\_Post@mcgraw-hill.com" <Nadine\_Post@mcgraw-hill.com>  
**Cc:** "Pregrp@aol.com" <Pregrp@aol.com>, "Gail Crum" <crum@nist.gov>

Rich,

À

Our report states that observations support a single point of fire ignition on any given floor in WTC 7. We also state that there were no obvious pathways for the flames and heat to pass from one floor to another, aside from the debris damaged area in the southwest corner of the building. We also did not see flame spread outside the building.

À

The fires in WTC 7 were similar to fires in the other buildings cited due to seven specific factors we identify in the report:

1. Ordinary combustibles and combustible load levels.

2. Local fire origin on any given floor.
3. No widespread use of accelerants.
4. Consecutive fire spread from combustible to combustible.
5. Fire-induced window breakage providing ventilation for continued fire spread and accelerated fire growth.
6. Concurrent fires on multiple floors.
7. Active fire protection systems rendered ineffective (sprinklers and manual suppression systems).

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Shyam

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Dr. S. Shyam Sunder  
Director  
Building and Fire Research Laboratory  
National Institute of Standards and Technology  
Gaithersburg, MD 20899-8600  
Tel.: 301-975-5900; Fax: 301-975-4032

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**From:** FPESCHULTE@aol.com [mailto:FPESCHULTE@aol.com]  
**Sent:** Tuesday, August 26, 2008 5:47 PM  
**To:** Nadine\_Post@mcgraw-hill.com  
**Cc:** Shyam Sunder; Pregrp@aol.com  
**Subject:** Section 13.2, NIST Report WTC 7

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Nadine-

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Item 9 on page 602 of the report indicates that the collapse of WTC 1 caused the ignition of fires on 10 separate floors. These floors occurred in groups-7/8/9, 11/12/13, 19, 22, 29/30.

À

Based upon what I have read in the report, I do not believe that this is the case. **NIST indicates that 6 separate fires must have occurred on Floors 7, 8, 9, 11, 12 and 13 because NIST did not see any indication of flame spread outside the building.**

À

My opinion is that the collapse of WTC 1 caused fires on Floors 7 and 11 and that the fires spread to floors 8 and 9 and 12 and 13 through either improperly firestopped penetrations or through the improperly firestopped space between the edge of the floor construction and the exterior curtain wall. In other words, the fire spread was interior to the building. This would account for the fire spread on various floors lagging each other.

A

NIST cites both fire in the First Interstate Bank Building and the One Meridian Plaza Building as examples of where fires spread between floors on the exterior of the building, however, the fire spread in the One Meridian Plaza Building was interior, not exterior. The fire spread through improperly firestopped penetrations.

A

Just as an aside, fire spread between floors occurred in the fire at the Las Vegas Hilton Hotel fire in 1981. If I recall correctly, in this fire, the fire spread 8 floors in 25 minutes via the outside of the building-window to window above.

A

The NIST report on WTC 7 includes no information on the firestopping detail of the space between the edge of the floor construction and the curtain wall. This is a glaring omission in the report.

A

rich

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David S. Collins, FAIA  
**The Preview Group, Inc.**  
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513.621.7297 (f)

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From: Shyam Sunder <sunder@nist.gov>  
To: "'pregrp@aol.com'" <pregrp@aol.com>  
Subject: Re: Fire Progress

Dave,

Hopefully my previous response sent in a separate email addresses this question as well.

Shyam

---

**From:** pregrp  
**To:** Shyam Sunder  
**Sent:** Wed Aug 27 08:43:07 2008  
**Subject:** RE: Fire Progress

Shyam,

On Aug 26, 2008, at 5:59:25 PM, "Shyam Sunder" <sunder@nist.gov> wrote:

| The increase in the hot area in Figure 3-6 is due to this process.Â Hope this helps

The hot area doesn't show a process, it appears to be steady state.

Dave

--  
David S. Collins, FAIA  
**The Preview Group, Inc.Â**  
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From: Shyam Sunder <sunder@nist.gov>  
To: "pregrp@aol.com" <pregrp@aol.com>  
Subject: Re: Fire Progress

Dave,

The air in the upper layer on the particular floor is being heated by the fire below it. As the fire burns, the air gets hotter, while being cooled by heat loss to the ceiling. As the ceiling gets hotter, the heat loss becomes smaller. Even though the fire is moving, it is still pumping heat into that hot upper air layer. The "old" ceiling area where the fire was is still getting some heat from the area where the fire has moved.

A similar point applies to the steel and concrete. They are initially heated by the hot gases over the local fire. The steel and concrete are dissipating heat within their masses. As the fire moves, the enlarging hot upper layer continues to heat the steel and concrete. Again, the "old" ceiling area where the fire was is still getting some heat from the area where the fire has moved. The hot areas stay hot for a while due to thermal inertia, and continue to receive more heat from the nearby fire.

Shyam

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**From:** pregrp  
**To:** Shyam Sunder  
**Sent:** Wed Aug 27 09:23:31 2008  
**Subject:** Re: Fire Progress

Shyam,

On Aug 27, 2008, at 8:49:41 AM, "Shyam Sunder" <sunder@nist.gov> wrote:

| Hopefully my previous response sent in a separate email addresses this question as well.Â

Thanks, I am still not clear on this. Â In WTC 1 & 2 we saw the evidence in videos of the fire progressing through the building and the heat affect progressing at the same rate. Â In 7 it appears that the heat hasn't changed over a 2 hour period. Â I understand your explanation of how the fire progressed from one area to another, although there are probably more general fire areas that are burning simultaneously. Â If the fire source only lasts 20 minutes, why does the heat in the area last six times as long as the fire?

Dave

--  
David S. Collins, FAIA  
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From: Pregrp@aol.com  
Subject: Re: Fire Progress  
To: sunder@nist.gov

Shyam,

In a message dated 8/28/2008 11:11:44 Eastern Daylight Time, sunder@nist.gov writes:

| As the fire moves, the enlarging hot upper layer continues to heat the steel and concrete. Again, the  
| "old" ceiling area where the fire was is still getting some heat from the area where the fire has moved.  
| The hot areas stay hot for a while due to thermal inertia, and continue to receive more heat from the  
| nearby fire.

Thanks, I understand that and we saw the movement of the fire in WTC 1 and 2. In WTC 7 it appears to begin as a large fire area and stay that way for two hours. Are you saying that the fire reached those high temperatures and was fed sufficiently by the moving fires to keep the entire floor area (ceiling) at those temperatures for 2 hours?

I would have expected to see the fire start and progress ... there seems to be none of that here.

Dave

---

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From: Shyam Sunder <sunder@nist.gov>  
To: "rgann@nist.gov" <rgann...snip...nist.gov> <terri@nist.gov>  
Subject: Fw: Fire Progress

Any reactions? How do we want to respond? Shyam

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**From:** Pregrp@aol.com  
**To:** Shyam Sunder  
**Cc:** rgann@nist.gov ; terri@nist.gov ; Stephen Cauffman; wtc@nist.gov  
**Sent:** Thu Aug 28 17:24:39 2008  
**Subject:** Re: Fire Progress

Shyam,

In a message dated 8/28/2008 11:11:44 Eastern Daylight Time, sunder@nist.gov writes:

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Dave

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From: Shyam Sunder <sunder@nist.gov>  
To: "Pregrp@aol.com" <Pregrp@aol.com>  
Subject: Re: Fire Progress

Yes, Dave. There was a lot of combustible material. The fire did move, but the combustible vapors burned where they met with air from the windows. Shyam

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**From:** Pregrp@aol.com  
**To:** Shyam Sunder  
**Cc:** rgann@nist.gov ; terri@nist.gov ; Stephen Cauffman; wtc@nist.gov  
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Dave

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From: Shyam Sunder <sunder@nist.gov>  
To: "wtc@nist.gov" <wtc@nist.gov>  
Subject: FW: Fire Progress

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Dr. S. Shyam Sunder  
Director  
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**From:** Shyam Sunder  
**Sent:** Tuesday, August 26, 2008 5:59 PM  
**To:** 'Pregrp@aol.com'  
**Cc:** 'rgann@nist.gov'; 'terri@nist.gov'; Stephen Cauffman; Gail Crum  
**Subject:** RE: Fire Progress

Dave,

While a particular cluster of furnishings might burn out in about 20 min to 30 min, the combustibles in a whole region of a floor could (and did) burn for a much longer time. On Floor 12, the fire was spreading from office to office. To do so, the fire in the first office had to heat the ceiling tile system to the point of collapse, then form a hot gas layer over an adjacent office. When that layer was sufficiently hot, it would thermally fail the ceiling tile system over that office and then ignite the furnishings by thermal radiation (not flame contact). Thus, the spread to the adjacent office would be occurring at some time well after when the first office ignited and before it burned out. This process could accelerate when the hot upper air layer became large enough that it ignited more than one office at a time. The increase in the hot area in Figure 3-6 is due to this process. Hope this helps.

Shyam

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**From:** Pregrp@aol.com [mailto:Pregrp@aol.com]  
**Sent:** Thursday, August 21, 2008 12:17 PM  
**To:** Shyam Sunder  
**Subject:** Fire Progress

Shyam,

I have one question regarding the collapse of WTC 7 and its relationship to what we saw in WTC 1 and 2. In 1 and 2, there were observable fires on floors where we saw the progress of the "standard fire" moving through

the building in about 20 minute segments which equated to the 10 lb fire load. In WTC 7 your diagrams indicate that the fire on the 12th floor in the vicinity of Column 79 lasted from 3 pm to 5 pm (Figure 3-6).

In WTC 1 and 2 we understand that there was some extraordinary fuel compression plus the added fuel from the aircraft and the instantaneous ignition of it all that caused significant exposure to columns in the core which led to the collapse. What was the source of fuel that fed the fire around column 79 and along that side of the WTC 7 building for two hours?

Dave

David S. Collins, FAIA

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